WHAT IS CLAIMED IS:

1. A semiconductor device having an inverter circuit, the inverter circuit comprising:

a first transistor;

a second transistor;

a third transistor;

a fourth transistor; and

a first capacitor,

wherein the first transistor includes a first gate and a second gate,

wherein one of a source and a drain of the first transistor is directly connected to the first gate of the first transistor,

wherein the other of the source and the drain of the first transistor is electrically connected to a first wiring,

wherein the second gate of the first transistor is electrically connected to a second wiring,

wherein one of a source and a drain of the second transistor is directly connected to the one of the source and the drain of the first transistor,

wherein the other of the source and the drain of the second transistor is electrically connected to a third wiring,

wherein one of a source and a drain of the third transistor is electrically connected to a fourth wiring,

wherein the other of the source and the drain of the third transistor is electrically connected to a first electrode of the first capacitor,

wherein a gate of the third transistor is electrically connected to the fourth wiring,

wherein a second electrode of the first capacitor is electrically connected to the one of the source and the drain of the first transistor,

wherein one of a source and a drain of the fourth transistor is directly connected to the other of the source and the drain of the third transistor,

wherein the other of the source and the drain of the fourth transistor is electrically connected to the third wiring,

wherein a gate of the fourth transistor is electrically connected to a gate of the second transistor,

wherein a semiconductor layer in which a channel is formed of the first transistor is positioned between the first gate and the second gate of the first transistor, and

wherein each of the first to fourth transistors is an n-channel transistor.

2. The semiconductor device according to claim 1,

wherein one of the first gate and the second gate of the first transistor functions as a gate, and

wherein the other of the first gate and the second gate of the first transistor functions as a back gate.

3. The semiconductor device according to claim 1,

wherein one of the first transistor and the second transistor includes a semiconductor layer in which a channel is formed, the semiconductor layer including an oxide semiconductor.

4. An electronic device comprising:

the semiconductor device according to claim 1; and

one of a motor, a power storage device, a high-frequency heating apparatus, and a cooling device.

5. The semiconductor device according to claim 1,

wherein the second wiring is not electrically connected to the one of the source and the drain of the second transistor.

6. The semiconductor device according to claim 1,

wherein the second electrode of the first capacitor is electrically connected to a first terminal.

7. The semiconductor device according to claim 1,

wherein each of the first transistor, the second transistor, the third transistor, and the fourth transistor includes a semiconductor layer in which a channel is formed, the semiconductor layer including an oxide semiconductor.

8. A semiconductor device having an inverter circuit, the inverter circuit comprising:

a first transistor;

a second transistor;

a third transistor; and

a first capacitor,

wherein one of a source and a drain of the first transistor is directly connected to a first gate of the first transistor and one of a source and a drain of the second transistor,

wherein a second gate of the first transistor is electrically connected to a wiring,

wherein one of a source and a drain of the third transistor is directly connected to a gate of the third transistor,

wherein the other of the source and the drain of the third transistor is electrically connected to a first electrode of the first capacitor,

wherein a second electrode of the first capacitor is electrically connected to the one of the source and the drain of the second transistor,

wherein a semiconductor layer in which a channel is formed of the first transistor is positioned between the first gate and the second gate of the first transistor,

wherein each of the first to third transistors is an n-channel transistor, and

wherein the wiring is not electrically connected to the one of the source and the drain of the second transistor.

9. The semiconductor device according to claim 8,

wherein the second electrode of the first capacitor is electrically connected to a first terminal.

10. The semiconductor device according to claim 8,

wherein each of the second transistor and the third transistor includes a semiconductor layer in which a channel is formed, and

wherein the semiconductor layers of the first transistor, the second transistor, and the third transistor each include an oxide semiconductor.

11. A semiconductor device having an inverter circuit, the inverter circuit comprising:

a first transistor;

a second transistor;

a third transistor; and

a first capacitor,

wherein the first transistor includes a first gate and a second gate,

wherein one of a source and a drain of the first transistor is directly connected to the first gate of the first transistor,

wherein the other of the source and the drain of the first transistor is electrically connected to a first wiring,

wherein the second gate of the first transistor is electrically connected to a second wiring,

wherein one of a source and a drain of the second transistor is directly connected to the one of the source and the drain of the first transistor,

wherein the other of the source and the drain of the second transistor is electrically connected to a third wiring,

wherein one of a source and a drain of the third transistor is electrically connected to a fourth wiring,

wherein the other of the source and the drain of the third transistor is electrically connected to a first electrode of the first capacitor,

wherein a first gate of the third transistor is electrically connected to the fourth wiring,

wherein a second electrode of the first capacitor is electrically connected to the one of the source and the drain of the second transistor,

wherein a semiconductor layer in which a channel is formed of the first transistor is positioned between the first gate and the second gate of the first transistor, and

wherein each of the first to third transistors is an n-channel transistor.

12. The semiconductor device according to claim 11,

wherein the second transistor includes a first gate and a second gate, and

wherein the second gate of the second transistor is electrically connected to the first gate of the second transistor.

13. The semiconductor device according to claim 11,

wherein the second transistor includes a first gate and a second gate, and

wherein the second gate of the second transistor is electrically connected to the other of the source and the drain of the second transistor.

14. The semiconductor device according to claim 11,

wherein each of the second transistor and the third transistor includes a semiconductor layer in which a channel is formed, and

wherein the semiconductor layers of the first transistor, the second transistor, the third transistor each include an oxide semiconductor.